Mark Hopkins AND THE Digital Log

By Kenneth C. Green

More than one hundred years before the "high touch vs. high tech" metaphor migrated from John Naisbitt's 1982 book *Megatrends* into the now perpetual discussions about curriculum goals and campus technology policies, the basic tenants of "high touch" were articulated in the middle of a contentious faculty meeting at Williams College. The Williams alumnus (and future U.S. president) James A. Garfield, "responding to a professor's complaint . . . that Williams College was falling behind the times," defended his beloved alma mater by stating: "The ideal college is Mark Hopkins [president of Williams] on one end of a log and a student on the other."[1]

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Joyce Hesselberth

The log is now digital. Indeed, a casual stroll in almost any direction on almost any college or university campus today provides ample evidence of the growing presence of computing and information technology in the curriculum and as a core component of academic life. Technology has become ubiquitous. Today's students—be they traditional undergraduates matriculating directly from high school, single parents enrolled as part-time students in community colleges, adults returning to campus for a single course, forty-five-year old executive MBA students, or schoolteachers on campus during evenings and the weekend—come to campus to *learn about* and also to *learn with* computers and information technology.

Moreover, a comparatively small but growing number of today's students no longer come to campus. The Internet and other technologies have become a catalyst for what many on campus, in corporations, and at dot-coms believe will be an explosion in distance and distributed learning: more content, more courses, and more options for more learners from more providers than even the most ambitious and most entrepreneurial planners might have imagined just a decade ago. The competition for students is moving from physical place into cyberspace: established institutions as well as new, for-profit providers are in the early stages of developing business plans and strategic alliances that amend, extend, protect, and defend what some view as entitlement markets and others see as new market opportunities. *Welcome to higher education in the wonderful world of the Internet economy.*

Current and coming technologies will throw great light on and concurrently cast large shadows over the academic enterprise. Indeed, both the academic origins and the explosive growth of the Internet over the past decade serve to remind us of Clark Kerr's 1963 predictions about the relationship between universities and the then emerging knowledge industry: "What the railroads did for the second half of the last century and the automobile for the first half of this century may be done by the second half of this century by the knowledge industry: that is, to serve as the focal point for national growth. And the university is at the center of the knowledge process."[2] Almost forty years ago, Kerr's essay noted the often serendipitous (and occasionally symbiotic) relationship between campuses and corporations in the nascent knowledge industries.

Without question, the arrival and impact of new technologies, coupled with the growth of the knowledge industries, will serve as a catalyst for sustained, intense debate about institutional missions and the goals of higher education in the twenty-first century. In discussions regarding the research mission of higher education institutions, there appears to be little argument over the role of technology. By consensus, *more is better,* assuming, of course, that some benefactor—the state, a federal agency, a foundation, or a corporate sponsor—will pay for the technology now and pay again to replace it with something newer, faster, and more sophisticated two or three years from now.

The role of technology in the instructional mission, however, is a different matter. *The most significant technology challenges ahead for higher education involve questions about the instructional mission—across all sectors of the academic enterprise.* Moreover, these challenges have less to do with new products (computers, software, networks) and more to do with people and, by extension, institutional plans, policies, and politics: instructional integration (i.e., bringing technology to the classroom and into the syllabus and learning experience) and user support will continue to be the two most important information technology issues confronting all sectors of higher education in the next two to three years.[3]

In the context of this instructional mission, the discussion should focus on mission, mandate, and curriculum rather than hardware, software, and networks. Consequently, the truly important debates on campus and elsewhere about the role and impact of information technology will undoubtedly include the following five issues:

- *Convergence.* How will all sectors of higher education address the converging consequences of increased access, lifelong learning, and ubiquitous information technology in the coming decades?
- *Déjà Vu.* Given great aspirations for the role of information technology in instruction, what have faculty and administrators learned from the earlier experience with and investments in television and other technologies a generation ago?
- *The Productivity Conundrum.* As institutions confront growing pressure for productivity, should they use information technology to increase productivity by lowering cost or by raising quality?
- *Assessment.* What assessment models should we use, and how do we address assessment questions that involve information technology?
- *Vision and Visualization.* How do individual faculty members visualize themselves using technology in their instructional and scholarly work?

Admittedly, this list is not complete. Not included here, for example, are strategic and financial planning for information technology, the much-discussed digital divide, and the promise and potential of distance/distributed/online learning. Others have and will continue to address these topics. But the five issues listed above touch on core matters at the heart of the instructional mission across virtually all institutional and departmental segments of the academic community in the twenty-first century.

Convergence

Without question, convergence is *the* current buzzword of the Internet era. The *digeratti* speak of convergence with reference to computers, telecommunications, media, content and more—all delivered through the Internet to desktop computers, mobile notebook computers, personal digital appliances (PDAs), and cellular phones.

Yet in academe there are other convergence factors at play—specifically the convergence of great aspirations. Many faculty and administrators have forgotten the old Chinese greeting (or curse): "Be careful what you wish for, as it may come true." Three things at the top of academe's wish list for the past three decades—increased access, lifelong learning, and ubiquitous information technology—are indeed "coming true." Unfortunately, the campus community is largely unprepared for their converging consequences.

- *Increased Access.* Both developed and developing nations are experiencing exploding demand for access to higher education. In the United States, the proportion of recent high school graduates entering college has risen from just over half at the beginning of the demographic downturn of the early 1980s to almost two-thirds today. Rising demand—coupled with rising expectations—has been pushed by an escalating set of demographic, economic, and social factors. Indeed, one of the ironies over the past five years has been the simultaneous presence of increased enrollment *and* high employment. This confounds the conventional wisdom that enrollments at higher education institutions rise with increased unemployment and decline with high employment.
- *Lifelong Learning.* Today's students confront a future of not one job or career, but many. Growing numbers of adults—many with college or university degrees, many without—are attending traditional two- and four-year colleges and universities and other "postsecondary providers" for new kinds of education and certification. Students and employers alike have come to recognize that the bachelor's degree is not the end of the educational journey but is just another milestone. The growing demand for lifelong learning has generated new demands for services across various segments of the higher education community. For example, consider the estimated 300,000 workers who lost their jobs in southern California's aerospace and defense industries in the mid-1990s: many already had two or three degrees and did not want or need yet another one. Rather, they wanted and needed specific content and certification: Java to replace Fortran; HTML to replace Cobol; accounting and other management courses to replace engineering and physics. Most four-year institutions do not provide "unbundled" content; rather, they have placed these offerings at the periphery of the curriculum in executive education, extension programs, and other services. In contrast, community colleges understand the demand for unbundled content and certification: an estimated one-fourth of those taking courses in community colleges in California already have a college or university degree.[4]
- *Ubiquitous Information Technology.* Information technology is now ubiquitous across and beyond higher education. The difference today is not just the computers, the Internet, or the World Wide Web but the *aggregated presence* of these technologies in virtually all facets of daily life across so many sectors of the economy. Higher education's clientele—students aged seventeen to sixty-seven—now expect to *learn about* and to *learn with* technology.

So now that we have it, what do we do? Truth be told, despite an endless number of conferences, journal articles, policy documents, and strategic plans, the evidence indicates that as an "enterprise," virtually all segments of higher education are unprepared for the consequences of this convergence. We know we confront more traditional students, more adult learners, and more technology. Yet to date, much (if not most) of the writing and planning that addresses these issues seems conventional, piecemeal, and dated. Like aging generals, many academic leaders appear to be planning for the previous war, not the next one.

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Déjà Vu

Part of what seems to trouble many in the higher education community—technology advocates, antagonists, and agnostics as well as academic administrators and trustees—about the current claims for and continuing investments in computing and technology is a sense that we have been here before. And indeed, one need not spend too many hours in a library, let alone on the Internet, before the easy sound bites—remembrances of things past—emerge.

More than thirty years ago Patrick Suppes, a Stanford University professor and an early and well-respected innovator in the area of computer-assisted instruction, articulated a compelling vision for computers in education. With some minor editing, his words could serve today as a vision statement for both a conference presentation and a campus technology plan:

> Both the processing and the uses of information are undergoing an unprecedented technological revolution. Not only are machines now able to deal with many kinds of information at high speed and in large quantities, but it is also possible to manipulate these quantities so as to benefit from them in new ways. This is perhaps nowhere truer than in the field of education. One can predict that in

a few years, millions of schoolchildren will have access to what Philip of Macedon's son Alexander enjoyed as a royal prerogative: the services of a tutor as well-informed and as responsive as Aristotle.[5]

Suppes's vision clearly hits the high notes that drive much of the current campus discussion, engagement, and investment: more-powerful computers, more content, more interaction.

In contrast, consider a 1972 *Change* editorial written by the magazine's founding editor, George Bonham, about the failures of television in education:

> For better or worse, television dominates much of American life and manners. . . . Part of [the] lackluster record of the educational uses of television is of course due to the heretofore merciless economies of the medium. But profound pedagogic mistrust of the medium also remains a fact of life. The proof of the pudding lies in the fact that on many campuses, fancy television equipment . . . now lies idle and often unused. . . . Academic indifference to this enormously powerful medium becomes doubly incomprehensible when one remembers that the present college generation is also the first television generation. Television has shaped much of their lives and attitudes, and taught them much of what they know.[6]

Substitute *computers* for *television*, and Bonham's terse assessment speaks directly to many of the instructional challenges (and, some might say, instructional disappointments) that colleges and universities confront in the Internet era. The recommendations offered by Bonham almost thirty years ago—set national goals for the appropriate uses of television, cooperate with federal agencies to translate goals into public policy and practice, begin national pooling of instructional resources, and assess the economics of instruction with television—may seem strangely similar to some of the recommendations found in the recent final report of the congressionally chartered Commission on Web-Based Education.[7] *Plus ça change!*

Too, Bonham's 1972 editorial, read with near-perfect hindsight in 2001, reminds us that there is a wonderful irony at play in college and university classrooms across the country these days. The "first television generation," so described by Bonham, now represents the core of today's faculty. In contrast, today's "traditional" students, aged eighteen to twenty-two, are the "first computer generation": they were born around or after 1980, the year *Time* magazine named the computer its "Man of the Year."

It is almost too easy to cite George Santayana under these circumstances: "Those who cannot remember the past are condemned to repeat it." No doubt many *will* repeat the past. But the appropriate metaphor is less a circle (going round and round) than a cylinder (revisiting similar themes in somewhat different contexts). The mantra of the Internet era is "The Internet changes everything!" Yet the reason the Internet changes everything is that in the Internet age, there are few precedents for *anything*. Although there are similarities between the technologies represented by television and computers, the two groups of technologies—and the implementation challenges of integrating these technologies into teaching, instruction, and learning in higher education—are not identical.

In the emerging new world of higher education, it is increasingly clear that costs—tuition costs, operating costs, and "production" costs—really do matter.

The Productivity Conundrum

Often ambiguous notions of *quality* and *productivity* cast a long shadow over both public and private conversations about the role of information technology at all levels of education and in all sectors of the educational community. This is not surprising, given the great aspirations among many—teachers and professors, secondary school principals and college and university administrators, parents and public officials—for what technology might/could/*should* do to enhance teaching and learning.

In 1968, Robert Persig's *Zen and the Art of Motorcycle Maintenance* echoed the concern (and the complaint) of many in academe. Searching for an absolute measure of quality, painfully conscious of his own experiences as both graduate student and young faculty member, Persig asked in his journal and travelogue: "What the hell is quality?" What are the real and true attributes of quality in higher education? Is it found only among the elite nstitutions? If so, what does that suggest about the learning experience at "other" colleges and universities?

Fortunately, we can turn to economists to help us resolve any potential ambiguity regarding the definition of productivity. Productivity may be a new concept for most in academe, at least in the context of institutional values and priorities, but it is certainly a core concept for our colleagues in economics. Economists seem to agree that there are three components of productivity: cost, quality (ambiguous though that may be), and quantity. And they also seem to agree (if they agree on anything) that there are three circumstances under which productivity occurs:

1. The cost of production *declines* while quality *remains constant* (i.e., it costs less to produce each widget).
2. The cost of production *remains constant* while quality *improves* (i.e., it costs the same to produce each widget, but the firm produces a much better widget).
3. The cost of production *declines* while quality *improves* (i.e., it costs less to produce each widget, and the firm produces a much better widget).

Admittedly, production models and manufacturing metaphors are generally offensive to most faculty. But in the emerging new world of higher education, it is increasingly clear that *costs*—tuition costs, operating costs, and "production" costs—really do matter. And in the emerging new world order of higher education, some of the conversations about the *benefits* of technology often migrate into discussions about the link between technology and productivity. Casting a shadow over these discussions is the notion that under traditional economic models, investments in technology are supposed to improve productivity, which means that quality goes up and costs come down.

Certainly elements of these issues are at play today on campuses and in public policy discussions. Consider the 1998 report of the National Commission on the Costs of Higher Education. The commission identified productivity as a top priority for U.S. colleges and universities. Though it did not explicitly cite technology as a potential solution for some of the productivity challenges confronting higher education, the language of the commission's recommendations points in that direction:

> The Commission recommends the creation of a national effort led by institutions of higher education, the philanthropic community, and others to study and consider alternative approaches to collegiate instruction which might improve productivity and efficiency. The Commission believes significant gains in productivity and efficiency can be made through the basic way institutions deliver most instruction, i.e., faculty members meeting with groups of students at regularly scheduled times and places. It also believes that alternative approaches to collegiate instruction deserve further study. Such a study should consider ways to focus on the results of student learning regardless of time spent in the traditional classroom setting.[8]

In this context, state initiatives such as the Michigan Virtual University, the Kentucky Commonwealth Virtual University, and the Western Governors University reflect, in part, an assumption

that technology can be used to expand educational access and also reduce educational costs: state officials hope to offer more opportunities for more learners by investing in bits and bytes (content and technology), rather than mortar and bricks, as a new form of infrastructure for higher education. Concurrently, faculty across all types of institutions argue that technology is part of the new infrastructure that enhances the quality of content available to their students, who can both wander the stacks *and* surf the Web. Investments in technology are essential to supporting student and faculty access to online resources—that is, to enhancing the quality of teaching, learning, and scholarship.

So here's the conundrum: does technology improve productivity by lowering cost or by raising quality? Cost-conscious administrators and public officials might support technology because of the potential to reduce costs, typically labor (i.e., faculty) costs and other direct operating costs. In contrast, faculty might argue to leave funding constant but to focus on quality—to support technology as the catalyst that enhances how and what students learn.

Must we choose between the two? Unfortunately, this is where the conversation about productivity begins to get subjective. Our colleagues in economics may be able to define productivity, but they cannot tell us which outlook is more appropriate under what circumstances.

Assessment

Assessment and outcome issues constitute one of the most distressing aspects of the current conversations about information technology in higher education. Reduced to the most direct concerns of parents, faculty, and public officials, the key question is, "Does technology really make a difference?" That is, do students really "learn more" or "learn better" with technology tools and with technology-based instructional interventions? Does technology at least improve standardized test scores and, if so, by how much?

The research literature is ambiguous, at best, about the impact of various instructional technologies on learning outcomes. A pre-computer tome, *The History of Instructional Technology,* published in 1968, set the stage for future assessments: "The general conclusion from among all this research was that no significant difference was found among the treatment comparisons and, when significant differences were obtained, they seldom agreed with other findings on the same problem."[9] Thus began the contentious debate over the "no significant difference" findings. An early foray into this debate appeared as a chapter titled "Will Information Technologies Help Learning?," published as part of a 1973 report from the Carnegie Commission on Higher Education:

> Were it not that the "no significant difference" findings fly in the face of common sense and other myths, one

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might dismiss technology as irrelevant to learning. But who can deny the impact of printing technology on learning? . . . No significant difference findings confirm the fact that research on schooling is inadequate. They do not belittle the impact of technology on learning. The differences sought are generally differences in performance on tests of a subject's capacity to reproduce accurately information supplied by a teacher or teaching instrument in a formal school setting.

The absence of significance differences has a very significant positive implication, namely that learning as now measured is largely independent of the details of means and hence that issues of technology and policy on one hand and of learning methods on the other must be resolved on other grounds. *No significant difference findings leave wide open alternatives to the accepted ways of schooling, alternatives that might, according to some public preference, reduce costs, increase individualization, or offer some other dominating personal or social benefit without, at the very least, making any difference as far as measurable learning performance is concerned.*[10]

A decade later, just as microcomputers were beginning to arrive on campus and the notion of the "computer revolution" in higher education had become the topic of easy predictions and conference plenary sessions, Richard Clark's essay offered another assessment of the "no significant difference" findings: "The best evidence is that media are more vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes a change in nutrition. . . . Only the content of the vehicle can influence achievement."[11]

And still another decade later, following admittedly primitive but nonetheless much broader experience using desktop computers, a study by Thomas Russell offered a somewhat similar conclusion: "No matter how it is produced, how it is delivered, whether or not it is interactive, low-tech or high-tech, students learn equally well with each technology and learn as well as their on-campus, face-to-face counterparts even though students would rather be on campus with the instructor if that were a real choice."[12]

Consequently, it is not surprising that "high-touch" advocates cite the continuing "no significant difference" literature to question institutional investments. In response, "high-tech" enthusiasts point to primitive assessment tools, noting the current mandates by accrediting agencies and others to focus on outcomes as well as the absence of proven and widely deployed methodologies to do so. "High-tech" advocates also point to the changing nature of the technologies, which are increasingly interactive and which provide more—and, they argue, richer—content.

But here, as elsewhere, we have too often ignored past voices and wisdom. Indeed, some of the best work on the impact of technology on the learning experience was done a decade ago by Robert Kozma and Jerome Johnson at the University of Michigan. Although their work preceded the Internet and World Wide Web by several years, it nonetheless remains valid and valuable in the Internet era. The authors presented compelling evidence, drawn from case studies that focus on several disciplines at a number of campuses, about the role of information technology as a catalyst for (or enabler of) the qualitative enhancement of the learning experience. They identified seven ways that computing and information technology can be used in the transformation of teaching, learning, instruction, and the curriculum:

1. *From reception to engagement.* The dominant model of learning in higher education has the student passively absorbing knowledge disseminated by professors and textbooks. . . . With technology, students are moving away from passive reception of information to active engagement in the construction of knowledge.
2. *From classroom to the real world.* Too often students walk out of class ill-equipped to apply their new knowledge to real-world situations and contexts. Conversely, too frequently the classroom examines ideas of the context of gritty real-world considerations. Technology, however, is breaking down the walls between classroom and the real world.
3. *From text to multiple representations.* Linguistic expression, whether text or speech, has a reserved place in the academy. Technology is expanding our ability to express, understand, and use ideas in other symbol systems.
4. *From coverage to mastery.* Expanding on their classic instructional use, computers can teach and drill students on a variety of rules and concepts essential to performance in a disciplinary area.
5. *From isolation to interconnection.* Technology has helped us to move from a view of learning as an individual act done in isolation toward learning as a collaborative activity. . . . And we have also moved from the consideration of ideas in isolation to an examination of their meaning in the context of other ideas and events.
6. *From products to process.* With technology, we are moving past a concern with the products of academic work to the processes that create knowledge. Students . . . learn how to use tools that facilitate the process of scholarship.
7. *From mechanics to understanding in the laboratory.* The scientific laboratory is one of the most expensive arenas in the academy. It is also limited as a learning experience. So much time is required to replicate classic experiments . . . that there is little time left to explore alternative hypotheses as real scientists do.[13]

Kozma and Johnson's work stands as a reminder that we need more-sophisticated models for assessing learning outcomes. Indeed, as Robert Silverman, editor emeritus of the *Journal of Higher Education*, recently suggested, the model that has provided the conceptual basis for much of the research concerning higher education (and, by extension, almost all of education), including learning outcomes, is no longer viable:

> The industrial model no longer should have currency in the way we think, or in many social institutions and their cultural practices. Were this to be true for the research literature in higher education. And it better be the case if the ground of our research questions relate effectively to the larger social and cultural parameters with which higher education engages. Simply put—we need to raise research questions that not only allow us to know, but which focus on creating/adopting/and engaging in macro thematics, understand the complexity of our environments and contexts, and foster a deeply appreciative relationship among persons.[14]

What emerges is a clear and growing sense that we need better models, methodologies, and data to pursue these assessments. As a comparison, consider that despite massive corporate investments in information technology during much of the 1980s and early 1990s, the evidence of the impact that these investments have had on productivity over the past two decades has been ambiguous at best. Only in the past two years have researchers begun to tease out a technology factor in the rising productivity in the U.S. economy. So too will it take time, better data, and more sophisticated strategies for assessment to help us in academe better understand the impact of technology on teaching and learning.

The inability of many faculty to identify with the early adopters, the "techies," says much about the technology challenge that lies ahead.

Vision and Visualization

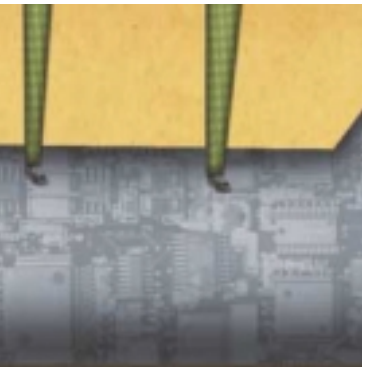
The campus conversation about technology often focuses on *vision:* what is the campus vision for the role of information technology in research, scholarship, teaching, and instruction? As a result of the millennium, campus vision statements have been proliferating on the Web as colleges and universities have prepared plans that outline and update the institutional mission and mandate (and also provide a foundation for new capital campaigns!). Yet too often these are little more than vacuous vision statements that make only a passing (if redundant) reference to the growing role of technology. Typically these statements fail to provide a real institutional vision—with an accompanying strategic, instructional, and financial plan—for information technology.

Accompanying institutional vision is *individual visualization*. Indeed, *visualization* (much like infrastructure) is a key factor in the technology-implementation process. Visualization ultimately enables individual faculty members to bring technology into their scholarly work and instructional activities. What is visualization? As consumers, we routinely engage in visualization every time we walk into a clothing store. We look at the clothes and perhaps touch the fabrics. We imagine ourselves wearing a particular item in specific settings and as part of what we might identify as "our wardrobe." And we ask ourselves: "Is it me?" Likewise, it is a safe guess that many faculty began their adventures in cyberspace first by visualizing themselves sitting in front of a computer, and then later by visualizing their efforts to use technology in the syllabus and the classroom. "Is it me?"

Of course, for today's middle-aged, midcareer humanists and qualitative social scientists, technology skills clearly were not part of the academic portfolio developed during graduate school training. Many of us instead visualized ways we could *avoid* computers: we were not "computer types," we told ourselves. We could not see ourselves using computers on a routine and regular basis. But the dramatic changes in computers and information technology over the past twenty years mean that many of us now use computers and depend on technology resources in ways we could not have anticipated—could not have *visualized*—during our graduate training two and three decades ago.

The visualization experience had other ramifications as well. Suddenly, thousands of academics who had never thought of themselves as "techies" now possessed the technical skills to do computer "stuff." In the years following the arrival of the first microcomputers on college campuses, growing numbers of "tweeds"—primarily but not exclusively academics in the humanities and the social sciences—slowly became "techies." And often they did so without much formal training or institutional assistance. The "early adopters" usually muddled through, investing their time to learn more about the technology that seemed to offer great potential for their scholarly work and instructional efforts.

Somewhere in the continuing discussion about integrating information technology into the curriculum and the classroom, the undocumented "consensual wisdom" began to suggest that successful implementation depends on this small "critical mass" of faculty who serve as role models for their peers. But the diffusion and innovation literature, plus our individual experience, inform us that the early adopters in the "critical mass" are different from the rest of us. For many of us, visualization as the first step into cyberspace has not been successful. Many faculty have found it very difficult to visualize themselves using various kinds of technologies, in particular in the classroom and as an instructional resource. Alas, the inability of



many faculty to identify with the early adopters, the "techies," says much about the technology challenge that lies ahead.

We do need the early adopters, but their presence alone does not ensure technology innovation and instructional integration. The rest of us must find our own way to visualize ourselves using information technology in our scholarly and instructional activities. And here our true peers are not the early adopters but rather the people "like us" who struggle with information technology—operationally, pedagogically, and perhaps even philosophically—almost every day. And as the rest of us visualize our own adventures in cyberspace, we need to know that our institutions are building and sustaining the technology infrastructure—the hardware, software, networks, user support, online resources, and recognition—that will support both our efforts and our aspirations.

Digital Light or Digital Shadows?

What lies ahead for colleges and universities and other sectors of higher education? What consequences will technology have on the instructional missions and mandates of the higher education enterprise? An extreme view of the future has been offered by the management sage Peter Drucker: "Universities won't survive . . . higher education is in deep crisis. Already we are beginning to deliver more lectures off-campus via satellite or two-way video at a fraction of the cost [of traditional courses]. The college campus won't survive as a residential institution. Today's [campus] buildings are hopelessly unsuited and totally unneeded."[15]

Yet universities and residential colleges will not vanish in the next two, three, or even four decades. With all due respect to Professor Drucker, the simple proof is probably to ask which college or university he wants his great-grandchildren to attend when they spend the trust-fund money. My guess is that he would likely cite the kinds of institutions where he held faculty appointments—institutions like Bennington College, New York University, and the Claremont Colleges—as opposed to Western Governors University, UNext.com, or Jones International University.

Similarly, it is increasingly apparent that colleges and universities have little to fear from Disney or Microsoft or other technology and entertainment/infotainment firms that were once demonized as probable providers of courses and degrees. These firms (and others) will continue to offer and certify certain kinds of largely technical training. Certainly, campus-corporate alliances in the distance and distributed market will be an important part of the broad educational landscape in the coming years, but it seems highly unlikely that technology will provide the core tools or key distribution channels that will make these firms serious competitors in the evolving world of higher education.

Clearly, information technology will play a major role in higher education during the twenty-first century. But the impact of technology on learning and on the instructional mission of academic organizations is the issue that should command our attention and concern.

Does the mantra of the Internet economy ("the Internet changes everything") apply to higher education? Of course. The reason the Internet changes everything is *because there are few or no precedents for anything*. And the absence of precedents absolutely applies to our discussions about the impacts of technology on the instructional mission of the colleges and universities in the twenty-first century.

Notes

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8. National Commission on the Costs of Higher Education, "Straight Talk about College Costs and Prices: Final Report," January 28, 1998.
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12. Thomas L. Russell, *The "No Significant Difference" Phenomenon as Reported in Research Reports, Summaries, and Papers* (Raleigh: North Carolina State University Office of Instructional Telecommunications, 1993), 2. See also Gerald Van Dusen, *The Virtual Campus: Technology and Reform in Higher Education*, ASHE-ERIC Higher Education Report, vol. 25, no. 5 (Washington, D.C.: George Washington University, 1997).
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14. Robert J. Silverman, "Distance Postsecondary Education: Research Implications," Division J invitational plenary address, American Educational Research Association conference, San Diego, 1998.
15. Peter Drucker, "Still the Youngest Mind," *Forbes*, March 10, 1997.